Numerical Models for the 19th century outbursts of Eta Carinae

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We perform two-dimensional hydrodynamic simulations of the interaction between the eruptive events suffered by the massive star eta Car in the 19-th century with the ambient stellar wind. During the giant eruption in the 1840s, the parameters of the eta Car wind (such as the mass loss rate and the ejection velocity) may drastically increased resulting in the formation of the bipolar nebula commonly known as the Homunculus. In the 1890s, eta Car was seen to undergo a smaller mass-ejection event (when the wind speed decreased and the mass loss rate increased for a short period of time) forming a bipolar structure lying inside the Homunculus, the so-called little Homunculus. Differing with previous numerical simulations, the little Homunculus is formed (after the minor eruption ended) from the collision between the post-outburst eta Car wind with the eruptive flow (both assumed to be inherently anisotropic outflows). Our simulations also show some tenuous high-velocity equatorial ejecta.